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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 15

Application Number: 09/141,287

Filing Date: 27 August 1998

Appellant(s): Hui-Jung Wu, et al.

Richard S. Roberts
For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed 21 June 2000.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

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(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is deficient because it has been modified to place an undue emphasis on the use of a specific class of solvents (monomethyl ethers) which was not originally provided in the specification and is therefore unwarranted. Compare the section entitled "Summary of the Invention" in the specification (page 3) to that on pages 3-4 of the present Reply Brief.

Examiner also disagrees with the allegation of novelty of the instant process.

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(6) *Issues*

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows:

Regarding Issue (a) on page 4, the present Examiner (hereafter, Examiner) can only assume that the omission of the rejection under 102(e) by the former Examiner -- *after* the first office action -- indicates that it was withdrawn. Nonetheless, Examiner will address the arguments presented by Appellant at the appropriate location.

(7) *Grouping of Claims*

(a) The rejection of claims 1-9 and 13-29 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(b) The rejection of claims 1-13 and 16-29 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(c) The rejection of claims 1-13 and 16-29 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

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(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

5,736,425	Smith et al.	4-1998
5,807,607	Smith et al.	9-1998

Lewis, R. J. Hawley's Condensed Chemical Dictionary, 12th Edition, Van Nostrand Reinhold Co.: New York, 1993, p. 393.

(10) *Grounds of Rejection*

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-13 and 16-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,736,425 (Smith et al.) in view of Hawley's Condensed Chemical Dictionary (Hawleys). This rejection is set forth in prior Office action, Paper No. 8.

Claims 1-13 and 16-29 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-53 of US Patent 5,736,425 or claims 1-39 of US Patent 5,807,607 (Smith et al.). This rejection is set

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forth in prior Office action, Paper No. 8. Each of these patents share a common inventor (Smith) with the instant invention, but not a common assignee.

(11) Response to Argument

Regarding Arguments presented under (A)

Examiner agrees with Appellant that this rejection has been withdrawn, but the arguments will still be addressed below.

Examiner believes that Appellant has misdirected himself regarding the 102(e) rejection. At the time the rejection was made, it was indeed proper for the following reason:

No requirement of a monomethyl ether solvent as an organic solvent in the alkoxysilane composition was made except in dependent claim 20. In addition, however, claim 20 recited other classes of non-monomethyl ethers solvents including alcohols (methanol, ethanol, etc.) as well as glycols, diols, and triols -- none of which are monomethyl ethers. (The -ol suffix indicates the OH, or alcohol, functional group attached via the oxygen atom to a carbon atom, e.g. C-OH.) Some of these non-monomethyl ethers are indeed included in the '425 patent (column 5, lines 8-12). Clearly, this anticipated all solvents in Appellant's claimed list of solvents, as all solvents were included in the same claim.

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Only *after* the 102(e) rejection was made did Appellant amend independent claim 1 (the only independent claim in the application) to exclude all of the non-monomethyl ether solvents which were clearly anticipated by Smith et al.

Regarding Arguments presented under (B)

Examiner disagrees with Appellant's allegation that a *prima facie* case of obviousness has *not* been established by the disclosure of Smith et al. US 5,736,425 in view of Hawley's Condensed Chemical Dictionary.

The question to be answered is, "Would one of ordinary skill in light of the disclosure of Smith and the teaching of Hawley's produce the instant invention?" Examiner believes yes. In Smith et al. ('425), the only requirements for a low volatility solvent are its having a boiling point of 175 to 250 degrees Celsius and being "miscible with both water and ethanol" (column 5, lines 5-8). Appellant's specification, too, indicates that such low volatility solvent have a boiling point higher than 175 C and more preferably higher than 200 C (page 6, first paragraph). The '425 patent continues "...three suitable low volatility solvent *candidates* are glycols..." (emphasis added) (column 5, lines 8-12). Clearly, this list is not limitative of appropriate solvents and even alerts those of ordinary skill that other solvents are appropriate. Therefore, both the method **and the suggestion** to use solvents dictated by the required properties is presented in the '425 patent alone. These same properties are required of the

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organic solvent composition in the instant application as both water and ethanol were present in the alkoxysilane composition (See page 6, lines 1-5; page 7, lines 1-2 and 5-7.)

Hawley's indicates, *inter alia*, that the boiling point of diethylene glycol monomethyl ether (the first in the list of solvents in Appellant's claim 1) is 194 C and that it is soluble in water. Those of ordinary skill would also know that it would be soluble in ethanol (the universal solvent). The solubility in ethanol (commonly, alcohol), although not in Hawley's is in the standard text, The Handbook of Chemistry and Physics, the 63rd ed., for example, entry 6125 on page C-268, as are selected properties of most known organic compounds including monomethyl ethers. Therefore monomethyl ethers fits the suggested properties provided by the '425 patent, i.e. the "known, required properties" which dictates the choice of organic solvents as in *United States v. Adams*, 383 U.S. 39 (1966).

Regarding Appellant's position that *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327 (1945), is inappropriate here, Examiner respectfully disagrees. On the contrary, it is especially appropriate here. The issue in *Sinclair* was whether or not the property of volatility of a solvent, as determined from its boiling point (Appellant's copy, page 5, lines 15-25), made obvious other solvents which were *not* specifically listed in the prior art. Similarly, at issue here is whether the solvents characteristics listed in the '425 patent, (especially having an appropriate volatility as indicated by a boiling point from 175-250 C [column 5, lines 5-12]), makes obvious the use of Appellant's specific class of solvents,

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monomethyl ethers, which preferably has a boiling point higher than 175 C and more preferably higher than 200 C (specification, page 6, lines 3-5). It cannot be ignored that Appellant also lists as "suitable" (specification, page 6, first paragraph) non-monomethyl ether solvents which were also expressly indicated as exemplary solvents in the '425 patent (column 5, lines 5-12).

To the contrary, *United States V. Adams*, 383 U.S. 39 (1966) (*Adams*, hereafter) concerns a composition for wet batteries having nothing to do with solvent compositions. At issue instead was the obviousness of an invention based upon the unexpected results obtained by combining known battery parts. *Adams* is appropriate here, however, in indicating that evidence of unexpected results is required when all of the other components are known in the art (paragraph bridging pages 8-9 of Appellant's copy, especially lines 43-45). By Applicant's own admission (Appeal Brief, page 12, lines 21-23), no evidence of unexpected results exists. In Appellant's specification, other non-monomethyl ether solvents were indicated as "suitable" and absolutely *no* means for comparing the effect of these other solvents on the resulting silica films have been provided. Appellant has provided no evidence of unexpected results as were required in *Adams* to establish the legal conclusion of nonobviousness. For this reason, *Adams* corroborates Examiner's position rather than that of Appellant.

Because Appellant presented no special benefits to using monomethyl ethers in the organic solvent *composition* in the alkoxysilane composition, but rather indicated that *other* classes of solvents (glycols, diols, triols) were appropriate (specification, page 6) and further

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attributed the unexpected benefits --*not* to monomethyl ether in the solvent composition-- but to “heating a wet alkoxysilane gel composition in an organic solvent *vapor atmosphere* after deposition onto a substrate” (specification, page 2, line 29). It is especially important to note here that the organic solvent *composition* is separate and distinct from the organic solvent *vapor atmosphere*, as recited in claim 1, steps (a) and (b). As such the solvents of the instant application themselves are merely solvents, just as in *Sinclair*, and were not shown in the original specification to possess special characteristics over the other solvents. Instead the solvents were only required to have a relatively low volatility during the aforementioned, beneficial heating step, to prevent premature evaporation from the alkoxysilane gel (page 6, lines 1-5).

Regarding *In re Ochiai*, the rejection of claims 1-13, and 16-29, under 35 USC 103(a) does not rely on a *per se* rule. First it should be noted that Examiner did not assert, as Appellant alleges on page 11 in the paragraph following the quote, that “the boiling point properties of the recited monomethyl ethers would have rendered their use in the process of claim 1 *prima facie* obvious.” Rather Examiner indicates that the properties of boiling point *and miscibility in both water and alcohol* were indicated in Smith et al. Furthermore, Smith et al. nowhere limited the solvents to glycols; glycols were merely indicated as exemplary (column 5, lines 5-12).

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Those points noted, Appellant's specification provides no means for distinguishing the method of the ('425) patent with that of the instant method as the list of solvents suitable for the organic solvent composition and relied upon for novelty overlaps those solvents provided in '425. The ('425) patent further indicates that preferred solvents have only (1) a boiling point of 175-250 C and (2) miscibility with water and ethanol, and therefore includes Appellant's claimed monomethyl ethers. *Absent evidence of unexpected results*, these solvents were given to the public by the '425 disclosure. That Appellant claimed the class of monomethyl ether solvents *only after being presented the '425 patent* cannot be persuasive of a nonobviousness method, much less as evidence of producing a better silica film when some of the solvents *not* claimed, but indicated as "suitable" by Appellant, were specifically recited in the prior art, '425 reference. **Appellant still claims such solvents in claim 20 and 16 which, nonetheless, have now been argued as "undesirable" by Appellant.** It is also of interest to note that canceled claims 14 and 15 *originally* required only that the solvents have a relative volatility to each other (low and high) and boiling point limitations --not the specific class of solvents *now* claimed. Also claim 16 (which interestingly depends from canceled claim 14) claims the use of polyols, the multi-OH-containing solvents argued as "undesirable" by Appellant (as explained above), for the "suitable" low volatility solvent.

Regarding Appellant's position that evidence of unexpected results should not be required, Examiner believes that the prior art in combination with the precedents of the

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aforementioned case law compels presentation of such evidence so as not to take from the public, that which the '425 patent has already irreversibly given it. In Appellant's response to the first office action, Paper No. 10, Appellant indicated the following concerning the use of use of the ethylene glycol solvent in the '425 patent, "It has been unexpectedly found that Smith's ethylene glycol undesirably crosslinks due to the **multiple OH groups** while this application's monomethyl ethers with a single OH group do not." (Emphasis added; Paper No. 10, page 3, lines 11-13). Appellant also recited, that the crosslinking "produce[s] a low storage stability composition" (page 3, lines 2-8). It is important to note that this unexpected observation was not presented anywhere in the original specification. Examiner believes that Appellant may be confusing this issue in the Apply Brief (page 12, lines 7-9) by indicating that the solvent is now somehow incorporated into the final silica film product which has not heretofore been presented. Rather, Appellant earlier argued that such alkoxysilane "composition" --not the final silica film-- was more stable than that in the '425 patent because a different solvent was used.

Examiner further respectfully forwards the following observation: If the multiple OH groups provide undesirable crosslinking, then why are glycols (two OH groups), diols (two OH groups), triols (three OH groups), and polyols (multiple OH groups) (1) indicated as "suitable" organic solvents (specification, page 6) and (2) even claimed as solvents (claim 20 and 16)? It would appear that Appellant is teaching away from the argument relied upon to dismiss the Smith et al. reference. This point obviates Appellant's

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argument (at page 12, lines 14-17) that the structural differences between glycols, diols, triols, polyols, and monomethyl ethers distinguish the latter as Appellant has, on the record, indicated that these “undesirable” solvents (only indicated undesirable *after* presentation of Smith et al.) were originally, and remain, indicated as “suitable” in the specification.

The requirement of evidence of unexpected results is even more compelling considering that the unexpected properties recited by Appellant are the same unexpected properties recited in Smith et al. ('425). Appellant indicates in the paragraph bridging pages 2-3 of the specification, that the unexpected result of the instant invention is attained by “heating a wet alkoxysilane gel composition in an organic solvent *vapor atmosphere* after deposition onto a substrate” (emphasis added), the result of which is “higher mechanical strength and lower K [dielectric constant]” of the nanoporous silica film attained thereby -- **the same properties as observed in Smith et al. ('425)** (column 5 line 51 to column 6, line 19). To the contrary, nowhere in the specification is it indicated that a monomethyl ether added to the organic solvent *composition* of the alkoxysilane composition provides unexpected benefits. Rather the specification recites a **list** of “[o]ther suitable low volatility solvent compositions” which are not monomethyl ethers, and further recites that “[o]ther suitable low volatility solvents ... can be readily determined by those skilled in the art.” (See page 6, first **paragraph**.) Note that the property of lower dielectric constant is inherent from lower density as admitted by Appellant (specification, page 2, lines 12-15).

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Furthermore, since the inventor Douglas M. Smith is present on both the earlier filed applications, which became the '425 and '607 patents, as well as on the instant application -- filed almost two years later -- it begs the question as to why the glycol, diol, triol, and polyol solvents were not indicated as inferior in Appellant's description of the prior art. Clearly, Smith had been aware of the organic solvents and their impact on the resulting silica films. If the monomethyl ethers were better solvents than the glycols, diols, and triols, why were they not indicated as such? Instead, those now-alleged "undesirable" solvents are still included in a list of "suitable" solvents in the specification of the instant invention and in claims 20 and 16. Again, this strengthens the need for Appellant to provide evidence of unexpected results -- specifically that the silica film produced by the instant invention is superior to that produced by the method in the '425 patent. Otherwise, the public will have taken away from them, knowledge already provided by the '425 patent by mere allegations of improved results provided by a class of solvents which Appellants could have easily distinguished from prior art solvents of which he must have been aware.

Regarding Appellant's request made *only after the Action made Final*, that Examiner provide evidence for the obviousness of the "combined stream" of claims 11-13, the present Examiner could not have addressed such a request as Examiner was not examining the application until now, but no response is believed to have been required for the following reasons. First, the official notice was provided in the first office action by the

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former Examiner (Paper no. 6, page 5, second paragraph), but not challenged in the first response and ultimately not until *after* the Action made Final. It is the responsibility of Appellant to provide compelling reasons as to why the "combined stream" is not an obvious to one of ordinary skill as a means for applying solutions in spin-on applications --especially since the case is presently before the Board -- See MPEP 2144.03. None has been provided.

Regarding Arguments presented under (C)

Examiner disagrees that the ground of rejection is legally impermissible for the reasons indicated above. All elements are present in patents of Smith et al. '425 or '607 (and assigned to Texas Instruments) in view of Hawley's.

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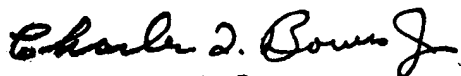
For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



EK

August 21, 2000



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